The Arctic: Transportation, infrastructure and communications

THE ARCTIC REGION IS BECOMING INCREASINGLY connected. The easing of transportation constraints as a result of easier navigation through the melting polar sea ice and the possibility of a navigable Northwest Passage are raising the prospect of greater physical linkages between Arctic communities and the rest of the world. For Arctic communities, transportation links within the region and beyond have been predominately by air. This has been extremely expensive and, given the rising price of fuel, will continue to be so for the foreseeable future. The increased use of marine transport can only help to alleviate the isolation of Arctic communities. At the same time, the Internet, wireless devices, and other information and communications technologies are connecting Arctic communities with one another and with other regions, creating new opportunities for personal interactions, telehealth services, education and business development. This paper discusses this evolving physical and virtual connectivity.

Arctic transportation and the Northwest Passage

Since the 1990s growing concern over the rapidly melting polar sea ice cover and debates over Arctic sovereignty have drawn attention to the lack of adequate transportation in the region and the associated infrastructure that would be needed to support improvements. The importance of transportation in the future development of the Arctic is now being appreciated as never before.

The Northwest Passage is a maritime route comprising seven channels through the Canadian Arctic Archipelago that connects the Davis Strait and Baffin Bay in the east to the Bering Strait in the west. Suggestions have been made that the melting of the polar sea ice will make navigation through the Northwest Passage a feasible and more economical alternative to the Panama Canal for freighter traffic in the relatively near future. Currently, super-sized cargo ships from East Asia have a difficult time delivering their cargo to the east coast of North America. The ships either have to be unloaded on the west coast and the goods transshipped east by rail or truck, or they must travel a great distance across the Indian and Atlantic Oceans to the east coast. Moreover, the volume of goods being shipped has resulted in traffic congestion and significant delays in the Panama Canal. The Northwest Passage potentially represents a less congested route between Europe and Asia – and one that is 7,000 km shorter than the current route.

However, there are two factors at play that may prevent the Northwest Passage from becoming a viable shipping route in the near future. First, the Panama Canal is expanding its facilities to include a third set of locks to handle larger ships. At present the Canal can handle only ships carrying a maximum of 4,000 containers (Panamax vessels). With increased lock capacity the Canal will be able to handle post-Panamax ships carrying up to 10,000 containers. This expansion is to be completed in 7 to 8 years and will greatly reduce the pressure on shipping lines to seek alternative routes like the Northwest Passage.

The second factor working against expanded shipping activities in the Arctic is the ice conditions in the region. Indeed, there is no consensus as to what the future holds in this regard. Transport Canada scientists believe that, even with melting sea ice, ice conditions are still too unpredictable to allow for regular commercial shipping. Environment Canada scientists believe that the complexity of ocean currents, the presence of large areas of landfast ice (ice attached to the land) and the extreme year-to-year variability of ice conditions in the Arctic will make the Northwest Passage less desirable, in the near term, than traditional routes. Given this unpredictability, it would be difficult for shipping companies to guarantee reliable transit times, which are key to the economic viability of the shipping industry.

One sector of shipping activity that is expected to increase, however, is tourism, specifically ecotourism and cruises. These enterprises are less dependent than commercial shipping on maintaining a fixed schedule and can adapt more easily to the vagaries of nature.

At the same time, such opportunities have reignited disputes, particularly between Canada and the United States, over which country has what legal rights with respect to the Northwest Passage. In this respect, the dispute concerns the legal status of the waters, not sovereignty over the Arctic islands. Canada considers the Northwest Passage to be part of its internal waters and therefore under domestic rather than international jurisdiction; it thus permits navigation provided that it takes place according to conditions and controls established by Canada. These include the protection of Canadian security interests, the environment, and the well-being of Inuit populations. For its part, the United States insists on the freedom of navigation of its marine vessels, including submarines. Ultimately, Canada and the United States have agreed to disagree over this issue.[1]

Infrastructure development within the Arctic. Although there has been much discussion about the movement of commercial ships through the Arctic, there has been little focus on transportation needs within the Arctic. Resource development, the shipment of goods into a region with little or no road access, and facilities to service cruise ships all require transportation infrastructure.

To date, the construction of port facilities in the Arctic has been extremely limited. Everything that comes into Arctic communities arrives by sea or air. Although air transport is extremely expensive, there are inadequate docking facilities to receive cargo transported by sea. Marine vessels have to anchor offshore and unload their cargo to barges, which are then dragged above the high-water mark on the beach. This process takes time, increases the likelihood of damage and accidents and ultimately drives up costs.

For communities to take advantage of the expansion of resource industries, increased tourism and services for increased marine activities, Arctic communities will require marine infrastructure. This will be a critical step toward reducing costs and improving services to these communities. In addition, if the transshipment of goods between cargo vessels does become a routine practice in the North, port infrastructure will be needed to service these vessels and to ensure that adequate repair facilities are in place.

The federal government is looking at the transportation infrastructure needs of the Arctic region. It understands the strategic importance of this area in terms of economic development, environmental protection and security, as well as the necessity for adequate transportation facilities. To this end, the government is examining the possibility of establishing an Arctic Gateway Council, a federal agency, to determine transportation priorities and coordinate efforts to ensure that the required infrastructure is developed to take full advantage of the Arctic's potential.

Information and communications technologies. The term "information and communications technologies" (ICTs) refers to any communication devices or applications, including radio, television, cell phones, computer and network hardware and software, and satellite systems. It also includes various services and applications, such as videoconferencing and distance learning. The importance of ICTs lies less in the technologies themselves than in their ability to create greater access to information and communication.

Until the 1930s, Canada's Arctic communities were isolated from one another and from the rest of Canada, the only communications taking place by personal contact or mail carried on annual supply ships. From the 1930s onward, high-frequency radio was used for medical emergencies and for business. Broadcast radio allowed Arctic communities to keep up to date with news from the rest of Canada; later, taped television shows became available. However, these communications were almost entirely one-way, south to north.

The launch of the Anik A1 satellite in 1972 allowed the Canadian Broadcasting Corporation (CBC) to begin transmitting television programming to Northern communities. Today, in addition to radio and television, communities in the North have access to broadband Internet.[2] Internet access allows easy two-way communication within Northern communities, among communities, and with people worldwide.

Since the late 1990s, the Canadian government has introduced a number of programs to help increase Canadians' access to ICTs, in particular the Internet. The goal of two recent programs, the Broadband for Rural and Northern Development Pilot Program and the National Satellite Initiative, both of which have now closed, was to increase access to broadband Internet and other ICTs in remote communities in particular, including those in the North.

- The **Broadband for Rural and Northern Development Pilot Program** was launched in 2002.[3] This $105-million capital fund supported the de-

ployment of broadband infrastructure, particularly in remote communities. The program provided up to $30,000 to a "community champion" sponsoring organization to develop a business plan to expand broadband access. Successful applicants received additional funding to implement their business plans. All funds have now been allocated, and no additional funding rounds are planned.

- The **National Satellite Initiative** was launched in October 2003 to make affordable satellite capacity available for the deployment of broadband services to communities in the far to mid-North and other isolated regions of Canada, where satellite technology is the only practical solution to communication challenges.[4] In 2004, 52 communities received satellite capacity valued at $20 million over 15 years on Telesat, Canada's public benefit transponder. In addition, an $85-million fund is available to finance the acquisition of satellite capacity. There will also be $50 million of funding capacity available for public and community institutions in the North on Telesat Canada's Anik F2 satellite.

Current status of Arctic ICTs. Because many Arctic countries (including Canada) contain large non-Arctic populations, the available data on ICT penetration in these countries[5] often do not give an accurate indication of the extent to which ICTs reach Arctic peoples in particular. To provide a baseline understanding of the state of ICTs across the Arctic, including the policy context, applications, training and current patterns of use, the Arctic Council,[6] through its Sustainable Development Working Group, is conducting an Arctic ICT Assessment.[7] Results of the assessment are expected to be delivered at the ministerial meeting of the Arctic Council in Norway in April 2009.

In Canada, the Inuit Tapiriit Kanatami[8] reports that in 2006 all Inuit communities had access to the Internet, and that the proportion of Inuit who had used the Internet in the previous 12 months was the same as that in the general population of Canada: 54% and 53%, respectively.[9] According to the Government of Canada, in 2003 over 90% of Yukon households had access to broadband Internet infrastructure,[10] and the government of Nunavut reports that in 2008 nearly all businesses and institutions and 50% of households have broadband access.[11]

Benefits of improved communications. Improvements in ICTs in the Arctic have applications in many areas, including health, education, business and personal communication.

- **Telehealth.** Satellite communications have enabled the growth of telemedicine to provide medical services to remote communities. The Canadian Society of Telehealth defines telehealth as "the use of information and communications technologies (ICTs), to deliver health services and transmit health information over both long and short distances."[12] It may be as simple as a telephone call between health professionals or as sophisticated as the use of satellite technology to conduct robotic surgery. Health Canada is promoting the increased use of telehealth in remote communities, particularly for specialist consultations that would otherwise necessitate travel to a distant hospital.[13]
- **Education.** ICTs open up numerous possibilities for education. Videoconferencing technology allows university, college or even high-school level courses to be taught by specialists based in other regions. For example, the University of the Arctic, a network of universities and colleges providing higher education and research in the North, uses ICTs to deliver education to students across the circumpolar Arctic.[14] The Internet provides students, teachers and researchers in the North with access to online learning materials, scholarly journals, and other research tools. It also allows them to communicate with their peers worldwide.
- **Business and personal use.** The Internet has allowed Arctic businesses to communicate with clients in the North and in other regions. It has also given Arctic residents access to company websites from other regions and the ability to engage in e-commerce. For personal use, Arctic residents now have access to the entire spectrum of Internet resources, including a wide variety of news sources, social networking sites, and numerous other resources that provide links to people in other Arctic communities and the rest of the world.

Conclusion

The Arctic is becoming increasingly connected, physically and virtually, with the rest of the world. Melting Arctic sea ice has the potential to allow increased navigation through the Northwest Passage, and an Arctic Gateway is being considered to coordinate transportation infrastructure needs. Rapidly developing ICTs, particularly the use of satellites to provide broadband Internet service to the most remote communities, have facilitated unprecedented speed of communication between Arctic communities and with the rest of the world. With environmental and energy issues focusing increased attention on the Arctic region, the availability of rapid communication tools will enable Arctic residents and businesses to participate in discussions on these issues.

Increased connectivity also brings challenges: for example, ICTs allow exposure to opportunities, such as online gambling, which have a potentially negative influence on the region, and a navigable Northwest Passage would lead to increased transportation-associated pollution as well as the risk of a major environmental incident.

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SOURCES

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2. Broadband comes from the words "broad bandwidth" and is used to describe a high-capacity, two-way link between an end-user and access network suppliers capable of supporting full-motion, interactive video applications. See Industry Canada, "Broadband Dictionary," http://www.broadband.gc.ca/pub/technologies/bbdictionary.html (accessed 18 August 2008).
3. Industry Canada, "Broadband for Rural and Northern Development Pilot Program," 2005, http://broadband.gc.ca/pub/program/bbindex.html (accessed 18 August 2008).
4. Industry Canada, "National Satellite Initiative," 2007, http://broadband.gc.ca/pub/program/nsi/index.html (accessed 18 August 2008).
5. For data on ICT penetration rates in Arctic states, see Organisation for Economic Co-operation and Development, "OECD Key ICT Indicators," http://www.oecd.org/document/23/0,3343,en_2649_34441_33987543_1_1_1_37441,00.html; and the Arctic Council, Sustainable Development Working Group, "ICT Snapshots by Arctic State," 2007, http://portal.sdwg.org/content.php?doc=30&xwm=true (accessed 18 August 2008).
6. The Arctic Council is a high-level intergovernmental forum whose aim is to promote cooperation, coordination and interaction among Arctic states. Member states of the Arctic Council are Canada, Denmark (including Greenland and the Faroe Islands), Finland, Iceland, Norway, Russian Federation, Sweden, and the United States of America. In addition to the member states, the Arctic Council has five permanent participants representing indigenous peoples. See the website at www.arctic-council.org for more information.
7. Arctic ICT Network Drafting Committee, "Arctic Information and Communication Technology Assessment (AICTA): Proposal and Rationale," 2006, http://arctic-council.npolar.no/Meetings/sao/2006%20sy/AICTA%20(1).doc (accessed 18 August 2008).
8. The Inuit Tapiriit Kanatami, the national Inuit organization in Canada, represents four Inuit regions: Nunatsiavut (Labrador), Nunavik (northern Quebec), Nunavut, and the Inuvialuit Settlement Region in the Northwest Territories. See their website at www.itk.ca for further information.
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